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| 10/021,174      | 10/29/2001  | David L. Angst       | ANGST 1-1-11-21-26  | 3306             |

7590 04/23/2003

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| EXAMINER |
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LEWIS, MONICA

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| ART UNIT | PAPER NUMBER |
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2822

DATE MAILED: 04/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/021,174

Applicant(s)

ANGST ET AL.

Examiner

Monica Lewis

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance, except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 17-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 17-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

### DETAILED ACTION

1. This action is in response to the amendment filed January 29, 2003.

#### *Response to Arguments*

2. Applicant's arguments with respect to claims 17-25 have been considered but are moot in view of the new ground(s) of rejection.

#### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 17, 20-22 and 25 are rejected under 35 U.S.C. 103(a) as obvious over Kimura et al. (Japanese Patent No. JP08181392A).

In regards to claim 17, Kimura et al. ("Kimura") discloses the following:

- a) a plurality of chemical element layers (For Example: See Figure 3);
- b) at least one of the chemical element layers defining a binary solder (11) having a first melting temperature (For Example: See Figure 3); and
- c) another one of the chemical element layers defining a solder quenching layer (10) (For Example: See Figure 3).

In regards to claim 17, Kimura fails to disclose the following:

- b) the solder formed by the chemical element layers has a usage temperature which is substantially higher than the first melting temperature of the binary solder.

Although Kimura does not specifically state that the solder formed by the chemical element layers has a usage temperature which is substantially higher than the first melting

temperature of the binary solder, the same materials are utilized as in Applicant's therefore they would display similar characteristics.

In regards to claim 20, Kimura discloses the following:

a) the quenching layer comprises an element selected from the group consisting of platinum, iron, cobalt and nickel (For Example: See Abstract).

In regards to claim 21, Kimura discloses the following:

a) a wetting layer (For Example: See Abstract and Figure 3).

In regards to claim 22, Kimura discloses the following:

a) the wetting layer comprises gold (For Example: See Abstract and Figure 3).

In regards to claim 25, Kimura discloses the following:

a) the solder comprises a ternary compound (For Example: See Abstract).

5. Claims 18, 19, 23 and 24 are rejected under 35 U.S.C. 103(a) as obvious over Kimura et al. (Japanese Patent No. JP08181392A) in view of Coult et al. (U.S. Patent No. 5,990,560).

In regards to claim 18, Kimura fails to disclose the following:

a) the binary solder comprises a sequence of chemical element layers each comprising a single chemical element of the binary solder, the chemical element layers forming a binary mixture close to the eutectic point of the chemical elements when melted at the first melting temperature.

However, Coult et al. ("Coult") discloses that the solder layer comprises a sequence of chemical element layers (For Example: See Column 2 Lines 4-22). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kimura to include a solder layer that comprises a sequence of chemical element layers as disclosed in Coult because it aids in causing the melting point of the solder to vary as the elements of the parts are absorbed (For Example: See Column 1 Lines 60-64).

Additionally, since Kimura and Coult are both from the same field of endeavor, the purpose disclosed by Coult would have been recognized in the pertinent art of Kimura.

Finally, the limitation of "forming a binary mixture close to the eutectic point of the chemical elements when melted at the first melting temperature" makes it a product by process claim. The MPEP § 2113, states, "Even though product -by[-] process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985)(citations omitted).

A "*product by process*" claim is directed to the product per se, no matter how actually made, *In re Hirao and Sato et al.*, 190 USPQ 15 at 17 (CCPA 1976) (footnote 3). See also *In re Brown and Saffer*, 173 USPQ 685 (CCPA 1972); *In re Luck and Gainer*, 177 USPQ 523 (CCPA 1973); *In re Fessmann*, 180 USPQ 324 (CCPA 1974); and *In re Marosi et al.*, 218 USPQ 289 (CAFC 1983) final product per se which must be determined in a "*product by, all of*" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "*product by process*" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

In regards to claim 19, Kimura fails to disclose the following:

a) the chemical element layers are gold and tin which form a binary solder mixture close to the eutectic point of gold-tin when melted at the first melting temperature.

However, Coult discloses that the solder layer comprises a sequence of chemical element layers that are gold and tin (For Example: See Column 2 Lines 4-22). It would have been

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obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kimura to include a solder layer that comprises a sequence of chemical element layers as disclosed in Coult because it aids in causing the melting point of the solder to vary as the elements of the parts are absorbed (For Example: See Column 1 Lines 60-64).

Additionally, since Kimura and Coult are both from the same field of endeavor, the purpose disclosed by Coult would have been recognized in the pertinent art of Kimura.

Finally, the limitation of "form a binary solder mixture close to the eutectic point of gold-tin when melted at the first melting temperature" makes it a product by process claim. The MPEP § 2113, states, "Even though product -by[-] process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985)(citations omitted).

A "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao and Sato et al.*, 190 USPQ 15 at 17 (CCPA 1976) (footnote 3). See also *In re Brown and Saffer*, 173 USPQ 685 (CCPA 1972); *In re Luck and Gainer*, 177 USPQ 523 (CCPA 1973); *In re Fessmann*, 180 USPQ 324 (CCPA 1974); and *In re Marosi et al.*, 218 USPQ 289 (CAFC 1983) final product per se which must be determined in a "product by, all of" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "product by process" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

In regards to claim 23, Kimura fails to disclose the following:

- a) an anti-oxidation layer.

However, Coult discloses an anti-oxidation layer (For Example: See Column 3 Lines 44 and 45). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kimura to include an anti-oxidation layer as disclosed in Coult because it aids in providing resistance to oxidation (For Example: See Column 7 Lines 45-64).

Additionally, since Kimura and Coult are both from the same field of endeavor, the purpose disclosed by Coult would have been recognized in the pertinent art of Kimura.

In regards to claim 24, Kimura fails to disclose the following:

- a) an anti-oxidation layer comprises platinum.

However, Coult discloses a platinum anti-oxidation layer (For Example: See Column 3 Lines 44 and 45 and Column 5 Lines 41 and 42). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kimura to include a platinum anti-oxidation layer as disclosed in Coult because it aids in providing resistance to oxidation (For Example: See Column 7 Lines 45-64).

Additionally, since Kimura and Coult are both from the same field of endeavor, the purpose disclosed by Coult would have been recognized in the pertinent art of Kimura.

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6. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as obvious over Kimura et al. (Japanese Patent No. JP08181392A) in view of Davis et al. (U.S. Patent No. 5,421,507).

In regards to claim 18, Kimura fails to disclose the following:

a) the binary solder comprises a sequence of chemical element layers each comprising a single chemical element of the binary solder, the chemical element layers forming a binary mixture close to the eutectic point of the chemical elements when melted at the first melting temperature.

However, Davis et al. ("Davis") discloses that the solder layer comprises a sequence of chemical element layers (For Example: See Figures 5a-5c). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kimura to include a solder layer that comprises a sequence of chemical element layers as disclosed in Davis because it aids in providing a high performance device (For Example: See Abstract).

Additionally, since Kimura and Davis are both from the same field of endeavor, the purpose disclosed by Davis would have been recognized in the pertinent art of Kimura.

Finally, the limitation of "forming a binary mixture close to the eutectic point of the chemical elements when melted at the first melting temperature" makes it a product by process claim. The MPEP § 2113, states, "Even though product -by[-] process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985)(citations omitted).



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A "*product by process*" claim is directed to the product per se, no matter how actually made, *In re Hirao and Sato et al.*, 190 USPQ 15 at 17 (CCPA 1976) (footnote 3). See also *In re Brown and Saffer*, 173 USPQ 685 (CCPA 1972); *In re Luck and Gainer*, 177 USPQ 523 (CCPA 1973); *In re Fessmann*, 180 USPQ 324 (CCPA 1974); and *In re Marosi et al.*, 218 USPQ 289 (CAFC 1983) final product per se which must be determined in a "*product by, all of*" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "*product by process*" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

In regards to claim 19, Kimura fails to disclose the following:

a) the chemical element layers are gold and tin which form a binary solder mixture close to the eutectic point of gold-tin when melted at the first melting temperature.

However, Davis discloses that the solder layer comprises a sequence of chemical element layers that are gold and tin (For Example: See Figures 5a-5c). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kimura to include a solder layer that comprises a sequence of chemical element layers as disclosed in Davis because it aids in providing a high performance circuit device (For Example: See Abstract).

Additionally, since Kimura and Davis are both from the same field of endeavor, the purpose disclosed by Davis would have been recognized in the pertinent art of Kimura.

Finally, the limitation of "form a binary solder mixture close to the eutectic point of gold-tin when melted at the first melting temperature" makes it a product by process claim. The MPEP § 2113, states, "Even though product -by[-] process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a

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product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985)(citations omitted).

A "*product by process*" claim is directed to the product per se, no matter how actually made, *In re Hirao and Sato et al.*, 190 USPQ 15 at 17 (CCPA 1976) (footnote 3). See also *In re Brown and Saffer*, 173 USPQ 685 (CCPA 1972); *In re Luck and Gainer*, 177 USPQ 523 (CCPA 1973); *In re Fessmann*, 180 USPQ 324 (CCPA 1974); and *In re Marosi et al.*, 218 USPQ 289 (CAFC 1983) final product per se which must be determined in a "*product by, all of*" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "*product by process*" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

7. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as obvious over Kimura et al. (Japanese Patent No. JP08181392A) in view of Akram (U.S. Patent No. 6,214,716).

In regards to claim 23, Kimura fails to disclose the following:

a) an anti-oxidation layer.

However, Akram discloses an anti-oxidation layer (For Example: See Column 4 Lines 4-7). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kimura to include an anti-oxidation layer as disclosed in Akram because it aids in providing resistance to oxidation (For Example: See Column 4 Lines 4-7).

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Additionally, since Kimura and Akram are both from the same field of endeavor, the purpose disclosed by Akram would have been recognized in the pertinent art of Kimura.

In regards to claim 24, Kimura fails to disclose the following:

a) an anti-oxidation layer comprises platinum.

However, Akram discloses a platinum anti-oxidation layer (For Example: See Column 4 Lines 4-7). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kimura to include a platinum anti-oxidation layer as disclosed in Akram because it aids in providing resistance to oxidation (For Example: See Column 4 Lines 407).

Additionally, since Kimura and Akram are both from the same field of endeavor, the purpose disclosed by Akram would have been recognized in the pertinent art of Kimura.

### ***Conclusion***

8. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure: a) Derkits, Jr. et al. (U.S. Patent No. 5,559,817) discloses a complaint metallization; b) Bacon et al. (U.S. Patent No. 5,622,305) discloses a bonding scheme; and c) Sasaki (U.S. Patent No. 6,053,395) discloses a flip chip bonding.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 703-305-3743.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final

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communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML

April 17, 2003

  
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